HONOLULU

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SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - APRIL 1976

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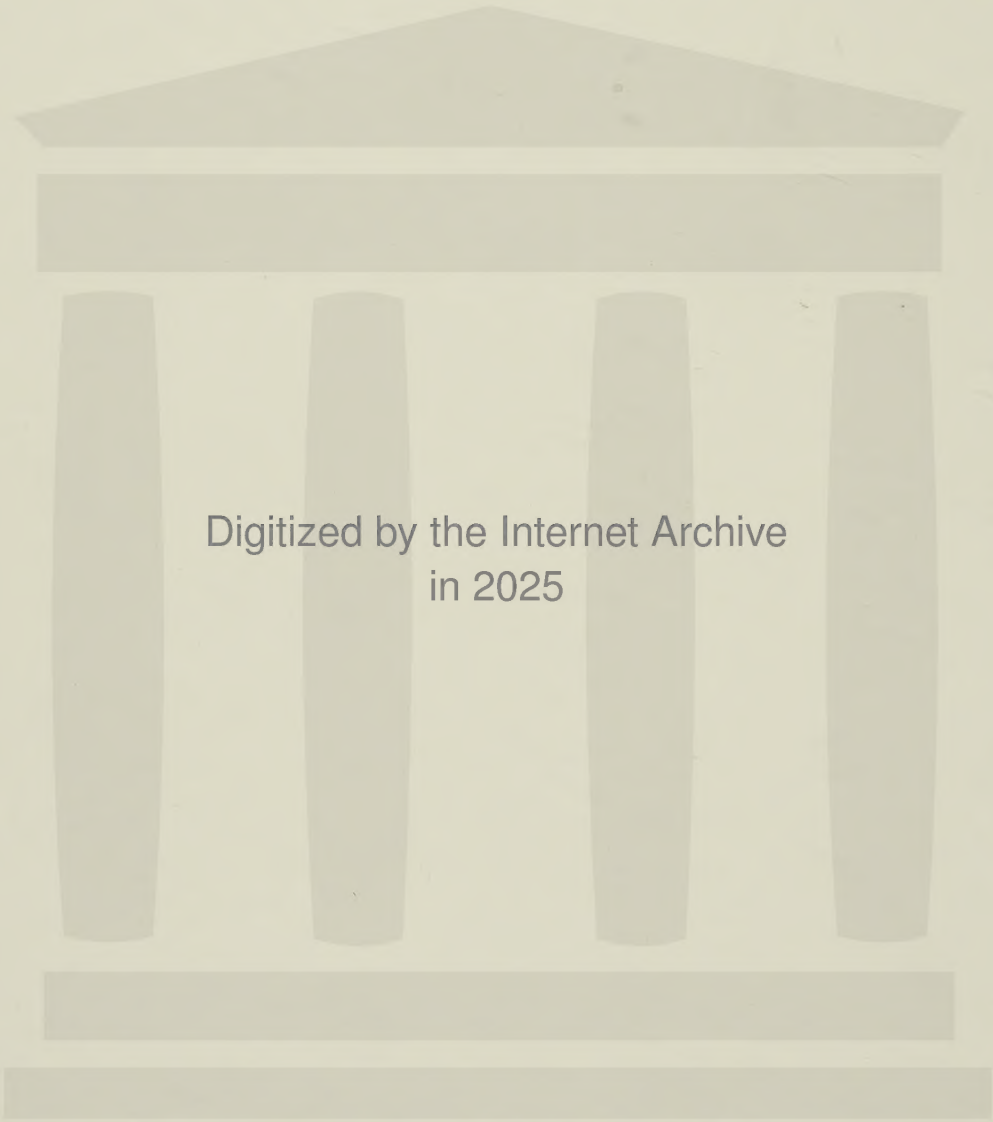

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SOUTHWEST FISHERIES CENTER
La Jolla, California

Honolulu Laboratory
La Jolla Laboratory
Tiburon Laboratory

MONTHLY REPORT - APRIL 1976

STATUS OF PUBLICATIONS

Published

Ahlstrom, Elbert H. and H. Geoffrey Moser. 1975. Distributional atlas of fish larvae in the California Current region; flatfishes, 1955 through 1960. Calif. Coop. Oceanic Fish. Invest. Atlas 23, xix + 207.

Brothers, Edward B., Christopher P. Mathews, and Reuben Lasker. 1976. Daily growth increments in otoliths from larval and adult fishes. Fish. Bull., U.S. 74(1): 1-8.

Daily growth increments have been found in otoliths of fish larvae. The daily nature of these layers was verified by examining larval fish of known age reared in the laboratory. A simple technique for observing these marks is described and can be used on otoliths from larvae and adults. This provides a convenient method for determining early growth in fishes and is particularly useful for fishes which do not lay down annual or seasonal rings.

Butler, John L. and Elbert H. Ahlstrom. 1976. Review of the deep-sea fish genus Scopelengys (Neoscopelidae) with a description of a new species, Scopelengys clarkei, from the central Pacific. Fish. Bull., U.S. 74(1): 142-150.

Scopelengys has been known previously from a few widely scattered collections. Recent collections by the Scripps Institution of Oceanography in the Pacific, the R/V Walther Herwig in the Atlantic, and the International Indian Ocean Expedition have made possible a critical study of this genus. No significant differences were found in either morphometric characters or meristic counts between specimens of S. tristis alcock from the eastern North Pacific (lat. 16° to 33° N, long.

This report does not constitute publication and is for information only.

117° to 126° W) and those from the eastern South Pacific (lat. 5° to 16° S, long. 77° to 90° W). When Pacific Ocean specimens were compared with those from the Atlantic and Indian oceans, no significant differences were found in morphometric characters, and although differences in average meristic counts were somewhat larger between oceans than among Pacific specimens, such differences exceed one for only one meristic character (gill rakers), and the ranges for all counts from all oceans almost completely overlapped.

Scopelengys clarkei is described from the central North Pacific. It differs from S. tristis mainly in pectoral ray count (2.5 average difference), average counts of vertebrae (3.3 average difference), deeper caudal peduncle, narrower maxillary, and in a differently pigmented larva.

Eber, L. E. 1976. Monitoring the ocean environment. Mar. Fish. Rev. 38(2): 1-9.

Hunter, John R. 1976. Culture and growth of northern anchovy, Engraulis mordax, larvae. Fish. Bull. U.S. 74(1): 81-88.

Culture techniques used to rear larval anchovy through metamorphosis using laboratory cultured foods are described. Anchovy larvae fed dinoflagellates Gymnodinium splendens, rotifers Brachionus plicatilis, harpacticoid copepods Tisbe furcata, and brine shrimp nauplii Artemia salina, completed metamorphosis (35 mm) in 74 days at 16° C with a minimum survival of 12.5%. Growth in length and weight were recorded over this interval and an excellent fit to the Laird-Gompertz growth equation was obtained. Growth was comparable to that on a wild plankton diet. In a starvation experiment, most of the fish that completed metamorphosis withstood a starvation period of 12-15 days, whereas those that had not completed metamorphosis did not.

Lord, Gary, William C. Acker, Allan C. Hartt, and Brian J. Rothschild. 1976. An acoustic method for the high-seas assessment of migrating salmon. Fish. Bull., U.S. 74(1): 101-111.

A system of free-floating acoustic buoys with upward-looking transducers has been developed for use in assessing high-seas salmon stocks. The transducers, operating at 120 kHz, are suspended 46 m below the surface. The fish counts and the range to each fish are obtained in digital form, and the data are radioed from each buoy to the tending vessel where the data are decoded and recorded on magnetic tape. The present system consists of four buoys although the receiver-decoder system can accommodate up to 10 buoys operating synchronously.

MacGregor, John S. 1976. DDT and its metabolites in the sediments off southern California. Fish. Bull., U.S. 74(1): 27-35.

To assess the degree of DDT contamination in the marine sediments off Los Angeles, 103 stations in the Pacific Ocean off southern California were sampled in July and August 1971 for DDT and its metabolites, DDD and DDE. Heavy contamination of bottom sediments in this area was expected because of large amounts of DDT that have entered the ocean through the Los Angeles County sewer system as waste from a DDT manufacturing plant.

From the data acquired, it was estimated that there were about 200 metric tons of DDT, DDD, and DDE in the sediments in an area of 14 square nautical miles near the sewer outfalls and 300 metric tons in the entire 911 square nautical mile area sampled. The heaviest concentrations of total DDT were distributed in the relatively shallow-water area on the Palos Verdes shelf to the northwest of the sewer outfalls in the general direction of the current flow.

Metabolism of DDT was inhibited in deepwater sediments. Ratios of DDE to DDT were low, and DDT was more abundant than DDE at some stations. In sediments from shallow-water stations, DDE exceeded DDT by more than 10 times.

Matsumoto, Walter M. 1976. Second record of black skipjack, Euthynnus lineatus, from the Hawaiian Islands. Fish. Bull., U.S. 74:207.

Struhsaker, Paul, and James H. Uchiyama. 1976. Age and growth of the nehu, Stolephorus purpureus (Pisces: Engraulidae), from the Hawaiian Islands as indicated by daily growth increments of sagittae. Fish. Bull., U.S. 74:9-17.

Direct evidence is presented that the sagittae of nehu, Stolephorus purpureus, grow by discernible daily increments. Aging by daily growth increments provides the means to establish a general growth curve for the first 6 months of life for this species. Adult nehu exhibit nearly linear growth between 30 and 60 mm standard length. Preliminary evidence is presented that the nehu population of Pearl Harbor may grow more rapidly than that of Kaneohe Bay.

Uchida, Richard N. 1976. Reevaluation of fishing effort and apparent abundance in the Hawaiian fishery for skipjack tuna, Katsuwonus pelamis, 1948-70. Fish. Bull., U.S. 74:59-69.

Catch per effective trip, used in 1948-64 as an index of apparent abundance of skipjack tuna, Katsuwonus pelamis, in Hawaiian waters, is biased because effective trip underestimates effort. Catch per day fished, calculated from data collected in 1965-70, is a refined index because effort includes days without catches. This paper describes the existence of a linear relationship between catch per effective trip and catch per day fished in 1965-70, and a method of estimating the latter from the former in 1948-64 based on this relationship.

Approved by Center Director

"Histological criteria for diagnosing the starving condition in early post yolk sac larvae of the northern anchovy, Engraulis mordax" by Charles P. O'Connell. For publication in the Journal of Experimental Marine Biology and Ecology.

"Measurements of sea surface temperature off San Diego, California, with a airborne infrared radiometry" by James L. Squire, Jr. For publication as a Special Scientific Report-Fisheries.

"Energy for migration in albacore Thunnus alalunga" by Gary D. Sharp and Ronald C. Dotson. For publication as a Note in the Fishery Bulletin, U.S.

The following papers resulting from the recent Baitfish Workshop held at the Honolulu laboratory have been approved for publication in a NMFS serial.

"A commercial tilapia, Tilapia mossambica, hatchery for the Hawaiian skipjack tuna, Katsuwonus pelamis, fishery--a cost analysis and problematical study" by Bruce L. Crumley.

"Baitfish study in Majuro, Marshall Islands" by Thomas S. Hida and James H. Uchiyama.

"Estimates of the amount of nehu, Stolephorus purpureus, per bucket of bait in the Hawaiian fishery for skipjack tuna, Katsuwonus pelamis" by Thomas S. Hida and Jerry A. Weatherall.

"Capture, transportation, and pumping of threadfin shad, Dorosoma petenense" by Robert T.B. Iversen and Jay O. Puffinburger.

"The Fishery for nehu, Stolephorus purpureus, a live bait used for skipjack tuna, Katsuwonus pelamis, fishing in Hawaii" by Richard N. Uchida.

"Catch statistics and the abundance of nehu, Stolephorus purpureus, in Kaneohe" by Jerry A. Wetherall.

"Evaluation of bait substitution schemes in the Hawaiian fishery for skipjack tuna, Katsuwonus pelamis" by Jerry A. Wetherall.

"The Pacific tuna pole-and line and live-bait fisheries" by Howard O. Yoshida, Richard N. Uchida and Tamio Otsu.

"Desired Characteristics of a bait for skipjack tuna" by Heeny S. H. Yuen.

Translation

Tanaka, Tamotsu. n.d. Atlas of skipjack tuna fishing grounds in southern waters, 1974 fishing season (July 1974-May 1975) (Nanpō kaiiki ni okeru katsuo gyojōzu, Showa (49 nendo). Tohoku Regional Fisheries Research Laboratory. [4 p. text, 13 charts.] (Translated from the Japanese by Tamio Otsu, 1976, 24 p., Translation No. 14.)

HONOLULU LABORATORY

FISH ENVIRONMENT INVESTIGATIONS

Data on Temperature Per Rate of Contraction of Skipjack Tuna White Muscle Will Be Used to Model Maximum Swim Speed

During April, the staff of the Experimental Ecology of Tunas group, under the direction of Dr. Andrew Dizon, Fishery Biologist at the Honolulu Laboratory, completed studies of the effect of temperature on contraction times of skipjack tuna white muscle. University of Hawaii graduate student Mr. Richard Brill found that as temperature increased, time to maximum tension decreased. At 12° C the muscle blocks would no longer contract, and at about 35° C would go into spontaneous heat contractions. Since contraction time determines maximum tail beat rate, temperature per rate of contraction data will be used to model maximum swim speed.

Measurement of Thermoregulation in Restrained Yellowfin Tuna Showed Rates of Change Significantly Greater for Positive Temperature Changes

To determine the capacity of yellowfin tuna to thermo-regulate, Mr. Minato Yasui of the Honolulu Laboratory measured tissue temperatures in restrained yellowfin tuna confronted with abrupt changes in water temperature. Stepwise multiple regressions of the data revealed some unexpected results: Both red and white muscle rates of temperature change were dependent to a significant degree on log body weight as expected, but rates of change were significantly greater for positive changes in temperature than for negative. Skipjack tuna, on the other hand, demonstrate rates independent of direction of change.

TUNA ASSESSMENT AND DEVELOPMENT INVESTIGATIONS

Procedure Developed for Estimating Maximum Likelihood of Tag Shedding Rates from Double Tagging Experiments on Three Tuna Species

During April, Dr. Jerry Wetherall, Fishery Biologist in the Tuna Assessment and Development Investigations at the Honolulu Laboratory, completed a manuscript entitled "Maximum likelihood estimation of tag shedding rates from double tagging experiments, with applications to three species of tunas." The paper, coauthored with Ms. Marian Yong, Mathematician, is concerned with an evaluation of standard least squares methods for estimating Type I and Type II shedding rates and the development of a new maximum likelihood estimation procedure. The new approach permits estimates of the shedding rates and associated sampling variances when only two recapture intervals are considered, a significant improvement over the least squares technique.

The maximum likelihood method was applied to dart-tag data for eastern Pacific yellowfin tuna, northwest Atlantic bluefin tuna, and North Pacific albacore. Maximum likelihood estimates of the shedding rates were close to the published least squares estimates. Coefficients of variation for estimates of the retention rate following Type I shedding were about 1 to 6%, but estimates of Type II shedding rates were much less precise--coefficients of variation of about 25% for yellowfin and bluefin and over 100% for albacore.

The paper, which will be submitted for publication in the U.S. Fishery Bulletin, also addresses important questions concerning strategy in double tagging experiments. These include the determination of sample sizes to yield estimates of shedding rates

with specified precision, and the optimal estimation of Type I and Type II shedding rates sequentially rather than jointly as is usually the case.

Two Manuscripts Prepared for Small Tunas Workshop Revised for FAO Species Synopsis Format

Again this month the Tuna Monitoring and Assessment staff put considerable effort into the revision of two manuscripts. Presented originally as background documents for the FAO Ad Hoc Committee to review the biology and status of stocks of small tunas, these documents are being revised to conform to the FAO species synopsis format. Mr. Richard Uchida has completed the basic revision of his manuscript "Synopsis of biological data of frigate mackerels, Auxis thazard (Lacépède) 1802 and A. rochei (Risso) 1810" to the species synopsis format, and is now editing the text. Dr. Robert Skillman has supplied a section reviewing the results of population genetics studies for the manuscript "Biology, ecology, and resource of the skipjack tuna, Katsuwonus pelamis." Revision of other sections continues in cooperation with the senior author, Mr. Walter Matsumoto.

Fishery Biologist Howard Yoshida also continued revision of two manuscript prepared originally for the small tunas workshop. "The biology and resources of the bonitos, genus Sarda" and "Biology and resources of the little tunas Euthynnus spp." are being re-written to conform more closely to the FAO species synopsis format.

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Computer Aid Lucille Tsukano has completed coding and key punching catch and effort data collected by the Hawaii State Division of Fish and Game for the months January-June 1975. Some of the catch reports have not been received by the State; there will, therefore, be a delay in completing the 1975 annual fish catch statistics for Hawaii.

Tests of Effectiveness of Northern Anchovy as Baitfish on Hawaiian Skipjack Tuna Sampans Planned

The relative effectiveness of the northern anchovy in pole-and-line fishing from Hawaiian skipjack tuna sampans is important to the future of substitute baitfish experiments at the Honolulu Laboratory. Mr. Uchida has drafted a plan that presents several alternatives with respect to sea-going experiments to determine this effectiveness.

System of Data Logs Drafted for Use on Western Pacific Purse Seine Cruises This Summer

Dr. Skillman, in cooperation with Mr. Uchida and Mr. Thomas Kazama, prepared a system of data logs for the Pacific Tuna Development Foundation (PTDF) western Pacific purse seine cruises to be conducted this summer. The data system was designed so that the several logs (school sightings log, purse seine fishing log, length frequency log, environmental data log, biological samples log) making up the system can be linked and merged to facilitate various analyses and comparisons of factors. Suggestions regarding priority and means of collecting various segments of the data were also made.

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The report of Mr. Tamio Otsu's trip to Japan in February was completed and mailed out.

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Catches in Hawaiian Skipjack Tuna Fishery Slightly Above Average For First Four Months of 1976

The April 1976 catch of skipjack tuna in the Hawaiian fishery reached an estimated 156.4 metric tons (MT), which was 42.8 MT above the catch for April of last year but 62.9 MT less than the April average for 1948-75. The catch from January through April was estimated at 668.3 MT, 61.1 MT above last year's catch for the same period and 93.3 MT above the long-term average.

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Pulou Niuatoa, employee of the Government of American Samoa, recorded the lengths of 656 albacore from 15 vessels unloading at Pago Pago during the period March 27 to April 23. He also collected 21 sets of catch and effort data. Research Assistant Ray Sumida, utilizing data from five vessels, calculated an average albacore size of 90.1 cm and a catch rate of 1.54 albacore per 100 hooks.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ALBACORE FISHERIES PROGRAM

NMFS/American Fishermen's Research Foundation Continue Cooperative Albacore Research

The albacore jig boats, on charter to the American Fishermen's Research Foundation (AFRF) and the Pacific Tuna Development Foundation (PTDF), respectively, and working cooperatively with the staff of the Albacore Fisheries Program at the La Jolla left San Diego on April 12 to conduct exploratory fishing operations to evaluate the possibilities for jig fishing for albacore in the western Pacific.

Dr. Laurs, leader of the Albacore Fisheries Program, made arrangements through the AFRF for the vessels to maintain detailed daily fishing records, make oceanographic (including surface and subsurface temperature observations) and marine weather observations (the XBT and weather observations are to be radioed ashore each day for use by the Navy Fleet Weather Center and the National Weather Service), and tag and release approximately 15% of the albacore tuna caught.

Mr. Robert Nishimoto, Fishery Biologist, assembled necessary data forms, tagging equipment, and scientific equipment for use by the vessels during their approximately 150-day charter. Mr. Nishimoto also assisted Dr. Laurs in briefing the captains of the vessels on procedures for obtaining the oceanographic and fishery observations. Electronic Technician Mark Sweeney installed XBT systems and radio facsimile records aboard the charter vessels.

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Dr. Michael Laurs attended a meeting in Eureka, California in early April of the Pacific Marine Fisheries Commission, California Department of Fish and Game, Oregon Department of Fish and Wildlife, and the Washington State Department of Fisheries, to work out arrangements for the albacore port sampling program for 1976.

Dr. Laurs also attended a NMFS-Environmental Data Survey Fisheries/Climate Workshop in Columbia, Missouri during the last week of April where he made a presentation to the group on real-time fisheries service.

STOCK AND RECRUITMENT PROGRAM

Study Completed on Vulnerability of First-Feeding Pacific Mackerel Larvae to Starvation

Dr. J. Hunter Fishery Biologist and his assistant Ms. C. Sanchez at the La Jolla Laboratory report that they completed a study in April on the timing of the onset of first feeding and the vulnerability of first-feeding Pacific mackerel larvae to starvation. The 50% threshold for the onset of feeding in mackerel larvae occurred 50 hours after hatching, at 19° C. At that time the yolk was nearly completely absorbed; only a small portion of the oil droplet remained. By the time the larvae were 60 hours old, all were capable of feeding. Forty percent of the larvae survived to the 8th day of life when fed 90 hours after hatching (40 hours after the beginning of feeding behavior) whereas only a few percent survived when fed 108 hours after hatching (58 hours after onset of feeding) and none survived when fed 130 hours after hatching. Thus, it appears that mackerel must find food between 90 and 108 hours after hatching or between 40 and 58 hours after they absorb their yolk and begin to search for food. Although no larvae survived if fed 130 hours after hatching, they were able to eat one or more rotifers in a 4-hour period. The number of rotifers eaten, however, was about one-third of that ingested by unstarved larvae. Thus starvation did not completely eliminate feeding behavior, but weakened the larvae to the extent that even at high food densities they were unable to eat a sufficient quantity of food to survive.

Anchovy Larvae Collected at Sea for Histological Evaluation of Health State

Over half of some 300 anchovy larvae collected at sea in March for histological evaluation of their state of health have been sectioned at the La Jolla Laboratory and will shortly be stained and examined microscopically. The criteria for estimating health, i.e., degree of emaciation, have previously been established by a laboratory study of fed and starved larvae. A majority of the larvae from the sea samples are in the 3 to 6 mm length range, which should bracket the stage following final yolk absorption, when signs of emaciation develop rapidly and death occurs if food is not obtained. Larger larvae from the collections, up to 24 mm in length, are also being processed. They will be evaluated on

the basis of criteria being developed from a current histological study of larvae that were deprived of food at various ages beyond yolk absorption. As they get older, the larvae can sustain fasting for larger periods before showing severe emaciation, but it appears that this state is foreshadowed by depletion of components such as connective tissue sheaths and matrices, and interstitial substances important to cell adhesion within organs.

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Dr. R. Owen Oceanographer and Mr. Vic Chow spent the month at the La Jolla Laboratory analyzing and reducing data from the March microstratification cruises on the research vessel Jordan. Chlorophyll analyses were completed and records from current meters located at the primary station off Cardiff, California were analyzed for current speed and direction. It appears from these records that the vertical stratification of organisms in March may have been diminished from that in September (Jordan Cruise 97) due in part to increased current shear evident from the March data.

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Analysis of nutrient samples collected during Jordan Cruise 97 from 20 cm intervals were received from the Data Collection and Processing Group of SIO. These exhibit marked variation of silicate and nitrate and little variation of nitrite and phosphate at the depth sampled (usually upper pycnocline). They will be compared with organism microstratification for indications of cause/effect relationships.

First Otolith Readings of Anchovy Larvae Collected at Sea Indicate Slower Growth Rate than in Laboratory-Reared Fish

Mr. D. Kramer, Fishery Biologist at La Jolla, has been aging the larger anchovy larvae (10 mm and longer) collected in plankton samples during the survey off southern California in March 1976. Ages are determined by counts of the daily increment in the otoliths of the larvae. Larger larvae (few in number) are being worked on first to determine the numbers of smaller larvae (greater in number) that must be studied in order to equalize variability.

The first readings have been made on larvae collected at about 16° C. The plot of size with age indicates that these 16° larvae have a growth rate comparable to larvae reared at 14° C in the laboratory, i.e., at a rate much slower than has been determined for anchovy larvae reared at 16° C. It is probable that this slower rate may be attributed to the fact that there is less food available to larvae in the field than the amounts used to rear larvae in the laboratory.

Indian Scientist Completes Visit

Dr. Vijayalakshmi R. Nair, a visiting scientist from India who worked at the La Jolla Laboratory under Dr. Alvariño's supervision, completed her 6-month stay at the laboratory in April. Dr. Nair conducted research on the Chaetognatha collected during the International Indian Ocean Expeditions. Research completed at the Center will appear in two publications which will describe the Chaetognatha population in the Indian Ocean in three dimensions, and changes in distribution in relation to the monsoon season.

ECOLOGY OF THE CALIFORNIA CURRENT PROGRAM

Twenty-One Participants Complete MARMAP Training Course at Center

The MARMAP Training Course at La Jolla on identification of fish eggs and larvae ended on April 16. The 4-week concentrated course had 21 full-time participants, as well as several auditors. During the course, 216 life history series were studied representing 98 fish families. Emphasis was placed on life histories of fishes of present or potential commercial importance with representative life histories from the western North Altantic as well as the eastern Pacific. For example, among the clupeids, three kinds were common to both regions, two were solely Atlantic, and only one (Sardinops caeruleus) was exclusively Pacific. Among the gadids (cods and relatives), five of the eight life history series were of Atlantic species. Among the scombrids, seven of eight kinds were common to both oceans.

The handouts (background materials) given to each participant have improved over time. For each day, these materials included 1) meristics of the species being studied, 2) illustrations of most life histories being studied, and 3) pertinent references dealing with life history series and usually also with adult taxonomy. This represents a sizable amount of materials: 18 pages of meristics, 249 pages of illustrations, and 44 pages of references. An innovation this year was the distribution of notes made on morning lectures. Valerie Loch made her notes available, and these were reproduced for all participants. These noted, together with other materials, are in effect a manual for identification of fish eggs and larvae.

Of the 21 full-time participants, 10 were from foreign countries: Mexico (3), Poland (2), Nigeria (2), El Salvador, Brazil, and India.

Dr. H. G. Moser gave four of the morning lectures, Dr. Ahlstrom the remaining 16. Additional afternoon lectures were presented by Drs. Reuben Lasker, John Hunter, Paul Smith, David Arthur and Angeles Alvariño.

Because this MARMAP training course was perhaps better organized, had more extensive background materials available, including lecture notes, had more lectures by other Center scientists working on various phases of fish egg and larval research, and had an involved hard working group of participants, than at past training sessions. Dr. Ahlstrom termed this the most successful training course yet presented.

Gardiner Foundation Awards Made by NMFS to Mexican Sportfish Boat Captains

Each year, through the auspices of the Gardiner Foundation of Oakland, California, awards are made by NOAA and the National Marine Fisheries Service to Mexican sportfish boat captains who tag and release the most billfish. The Foundation was established by the late Mr. Tom Gardiner to provide cash awards and plaques to encourage the tagging and release of billfish for the purpose of developing information useful in the management and conservation of billfish resources. According to Mr. J. Squire, Fishery Biologist at the La Jolla Laboratory, who has helped manage the award program since its inception, the awards have provided an increased stimulus to tagging of billfish in the southern Baja California area.

On April 20, 1976 at Rancho Buena Vista in Baja California, Mexico, Mr. Squire participated in an award ceremony honoring the cooperating boat captains. During 1975, 65 sport boat captains participated in the Gardiner Foundation award program, tagging a total 537 billfish. Along the east coast of the tip of Baja California, north to La Paz, the top captain Manuel Araiza Gonzalez tagged 82 striped marlin and 5 sailfish; the second place winner, Jesus Araiza Ruiz of Rancho Buena Vista tagged 27 striped marlin and 17 sailfish, and the third place captain, Gilberto Castro Collins, also of Rancho Buena Vista, tagged 17 striped marlin and 9 sailfish.

On this trip to Mexico, Mr. Squire also took the opportunity to contact all major fishing resorts around the tip of Baja California, Sur, Mexico regarding their continued participation in the Cooperative Marine Gamefish Tagging Program. Tagging supplies were distributed to the officials and discussions held regarding the future prospects of results from the tagging program in view of proposed restrictions in the operation of foreign longliner vessels off the Mexican coast.

Annual Report of Cooperative Marine Game Fish Tagging Program, Pacific Area, Distributed to 1,500 Anglers

Mr. J. Squire, who is in charge of the Cooperative Marine Game Fish Tagging program for the Pacific area, has completed a mailing to approximately 1,500 marine big game fishermen of the Annual Report of the program. The report includes the 1974 results of the Pacific Billfish Angling Survey, and a postcard return form for the 1975 survey. The International Game Fish Association in cooperation with the Southwest Fisheries Center is distributing 7,000 Pacific billfish angling survey forms for the 1975 survey.

Oceanic Fisheries Resource Division

TUNA RESOURCES PROGRAM

Sampling of Foreign-Caught Atlantic Tunas in Puerto Rico

During January through April 1976, Biological Technician Eugene Holzapfel of the La Jolla Laboratory measured 896 foreign-caught Atlantic tunas in Puerto Rico. Samples were obtained from the catch of French, Ghanaian, Japanese, Korean, and Spanish vessels. A summary of the samples by species follows:

Species	Gear	No. of fish sampled	Number of sample
Yellowfin	Baitboat	488	10
Skipjack	Baitboat	252	5
Bigeye	Baitboat	56	2
Albacore	Longline	100	2
Total		896	19

Tuna Vessels Participate in FAX Program

During April, 37 U.S. tuna seiners participated in the FAX program of the La Jolla Laboratory. Reporting rates for April were down from April 1975 by 28.4%, as shown below:

April Reporting Rates

	Weather observations	XBT observations	Monthly total	Total - year to date
1975	328	81	409	1264
1976	255	38	293	1078
Percent change	-22.3%	-53.1%	-28.4%	-14.7%

The decrease in the reporting rates for April results from the fact that many of the boats were in port or in transit following the completion of their first trip. Reporting rates are expected to pick up again in May.

The tuna seiner Santa Rosa led all cooperating vessels in April with 26 weather observations sent to the Southwest Fisheries Center via radio station WWD. The Santa Rosa's reports composed 8.9% of the total number sent in; congratulations are due to Noah and John Gomes of the Santa Rosa.

TUNA/PORPOISE PROGRAM

Results of Cromwell Survey of Porpoise Boundaries Now Available

In partnership with the NOAA research vessel, David Starr Jordan, the NOAA research vessel, Townsend Cromwell participated in a cruise to determine the boundaries of the porpoise populations involved in the eastern tropical Pacific tuna fishery. The Cromwell, based at Honolulu, departed that port on January 5 for Puntarenas, Costa Rica, and completed its assigned portion of the survey when it arrived in San Diego on March 3. Dr. David Au, Operations Research Analyst, La Jolla Laboratory, who was the scientific leader aboard the Cromwell has now filed a cruise report on the results of the work undertaken on the Cromwell.

Dr. Au reported that 114 porpoise and whale sightings were recorded; 56 of these were whale sightings. The porpoise schools were encountered in greatest frequency between the Galapagos Islands and 108° W, especially along the equator. In this region the thermocline depth was shallow (ca. 20 m) and Peru Current and tropical waters meet. Twenty-one whale sightings also occurred in this area, including an estimated 38 sperm whales in three groups. Most of the porpoise schools were striped dolphin, Stenella coeruleoalba (13 sightings). Other species seen included the common dolphin, Delphinus delphis (three schools), spotted dolphin, Stenella attenuata (four schools), and Fraser's dolphin, Lagenodelphis hosei (one school). All the striped dolphin were in schools of less than 100 animals, and six of the schools contained less than 50 individuals. The common dolphin schools ranged from 70 to 225 individuals, the spotted dolphin between 50 to 60 individuals, and the single school of Fraser's dolphin had about 200 animals. None of the schools was associated with birds, nor were fish seen beneath them.

The second area of abundant porpoise schools lay between Cocos Island and Puntarenas, Costa Rica, where eight sightings occurred. Except for one Delphinus school these were all striped dolphin. They were small schools, none exceeding 100 individuals.

Porpoise sightings along other portions of the cruise track were relatively sparse. Ten sightings were recorded between Puntarenas and Clipperton Island. These porpoise were in small schools and most could not be identified.

Four porpoise schools with estimated numbers greater than 500 were seen. One was an unidentified school just north of the Galapagos Islands, the other three were spinner dolphin and mixed spinner-spotted dolphin schools. The first of these spinner dolphins, S. longirostris (whitebelly form) was seen at 11°35' N, 146°33' W, as a school of about 500 animals in association with sooty terns. Next, two schools were seen at approximately 4° S, 113° W, the first with about 500 spinner dolphin, the second a mixed school of spotted and spinner dolphin, with about 2,000 animals total.

The Cromwell did not go far enough south to determine the southern hemisphere boundary of equatorial porpoise distribution, particularly in the region south of the Galapagos Islands. However, sightings along the track west of the Galapagos suggest sparse populations in the deeper thermocline waters beyond the area of the eastern tropical surface water.

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From porpoise/tuna observer data for the period of January 1 to April 14, 1976 and all of 1975, the staff of the Tuna/Porpoise Program at La Jolla determined that a greater-than-6% reduction in the porpoise kill occurred in the first part of 1976. According to Division Chief, Dr. William Fox and Mr. John Everett, Manager of the Tuna/Porpoise Program, this reduction appears to be due both to improved fleet performance in rescuing captured porpoise and to fewer sets involving porpoise.

Mr. Jeff Breiwick, a representative of the U.S. Marine Mammal Commission, was at the Center from April 26 to 28 to review NMFS use of the methodology to determine whether or not the U.S. tuna fleet had achieved the required 30% reduction in porpoise mortality.

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Dr. Joseph Powers of the Porpoise/Tuna Program has completed the analysis of the 1975 incidental porpoise mortality in the eastern Pacific tuna fishery. His analysis indicates an estimated porpoise kill of about 134,000 for the U.S. fleet and a total (U.S. and foreign) kill of about 159,000.

TIBURON LABORATORY

COASTAL FISH COMMUNITIES INVESTIGATIONS

Ecological Relations Among Fishes and Zooplankters Studied at Eniwetok Atoll

This month, Dr. Edmund Hobson, Project Leader, and Fishery Biologist Tony Chess, at the Tiburon Laboratory, took advantage of an opportunity to test hypotheses resulting from their work at Santa Catalina Island with the fauna of a coral atoll. Compared to the temperate zone kelp forests at Santa Catalina, the coral reef at Eniwetok Atoll, Marshall Islands, offers many more species occupying more clearly defined niches. Thus, not only were the hypotheses able to be rigorously tested, but also a measure was obtained of the extent to which it is possible to generalize regarding each.

Earlier studies at Kona Hawaii, and in the Gulf of California, had indicated that nearshore fish-zooplankton interactions in the tropics are similar to those studied at Santa Catalina, but comparable data were lacking. With the techniques developed at Santa Catalina, comparable data were obtained at Eniwetok that test the following hypotheses:

1. There is a sharp distinction between diurnal and nocturnal planktivorous fishes, with differences relatable to differences in the composition of the zooplankton between day and night.

2. The nocturnal planktivorous fishes prey mostly on larger zooplankters that are in the water column only at night.

3. The diurnal planktivorous fishes prey mostly on smaller zooplankters that are in the water column during both day and night.

4. The nocturnal planktivorous fishes, and the larger zooplankters that are their major prey, are most numerous in areas where water currents are weak.

5. The diurnal planktivorous fishes, and the smaller zooplankters that are their major prey, are most numerous in areas where water currents are strong.

Preliminary assessment of the observations and collections of plankton and gut contents from Eniwetok generally support all four hypotheses. There appear to be some exceptions, which rather than contradict the hypotheses, better define them.

Dr. William Lenarz Joins Rockfish Analysis Task

Dr. William Lenarz, formerly of the La Jolla Laboratory, joined the Task on March 29, and spent most of the past month reviewing the literature on rockfish, becoming acquainted with members of the program, and gaining experience with the computer system. He was at the Northwest Fisheries Center (NWFC) April 26 to 30 as a member of a task force on NOAA's International Marine Mammal Program. During a break in the work of the task force, he discussed possible cooperation between the NWFC and the SWFC on rockfish studies with Mr. Martin Nelson and Dr. Walter Pereyra, NWFC.

PHYSIOLOGY INVESTIGATIONS

Larval Experiments on Striped Bass Underway with Completion of Laboratory

The striped bass larval experimentation laboratory at Tiburon is now complete, with a new temperature control system, lighting

with photoperiod and intensity control, and wave length properties approximating natural sunlight, and new test containers and water tables. Communication with Elk Grove Hatchery, the California Department of Fish and Game (CF&G) staff has been established. Spawning of striped bass is somewhat delayed this year. The males caught in CF&G traps are maturing, but females are not yet fully mature. Mature fertilized eggs are expected to be obtained within the next 2 weeks.

In other developments in this investigation Mr. Mickey Eldridge conducted a series of experiments to determine the effects of preservation on the caloric content of larval tissues. Larvae were fresh frozen, fresh unfrozen, and preserved in formalin. Preliminary results were highly variable, but seem to indicate a lowering of calories with formalin preservation, while frozen and fresh samples were comparable.

Ms. Tina Echeverria continued experiments with the culture of zooplankton species to be used as food for striped bass larvae. She is being assisted by Doug Davenport, from Sonoma State University. They are continuing studies on phytoplankton culture methods. An experiment was conducted testing the salinity tolerances of four algal species; Chlorella, Nephroselmis, Dunaliella and an unidentified blue-green. All are utilized by at least one of the zooplankton species being cultured. Data are being analyzed presently. In addition, an experiment to measure the growth rates of Dunaliella and Nephroselmis at various temperatures is underway.

Ms. Tina Echeverria and Mr. Jeffrey O'Neill continued their Delta sampling program in which the day-night distribution of selected zooplankton species is being determined. The organisms are also being cultured for use in food experiments with striped bass larvae. A recent collection trip was made to Suisun Bay in the Delta to gather Neomysis and Cyclops for culture.

Mr. Pete Benville is completing a survey of the pollutants potentially affecting various stages of the striped bass in the San Francisco Bay-Delta area, particularly those affecting spawning females and males and the egg and larval stages. This survey will include a map of the inputs and available data on concentrations measured in these areas. The survey indicates that the greatest source of chronic pollution potentially affecting these stages is petroleum products in municipal wastes. A report is being prepared on this subject for submission on May 1.

Dr. Jeannette Struhsaker has been reviewing the literature on response-surface and multiple regression techniques in multivariate analysis of striped bass larval culture experimental data. A set of data work sheets for the initial food experiments was prepared with the staff, and summary data sheets are being prepared in the correct format for computer analysis.

Mr. Michael Bowers, a student from Sonoma State University, has completed a class project in the development of electrophoretic techniques for the analysis of three isoenzyme systems in egg and larval stages of striped bass. He is currently developing improved techniques to assess patterns in individual eggs and larvae. Changes in the occurrence of these enzymes with metabolic changes throughout development are expected. Intraspecific individual variation within stages will also be assessed.

ERL to Fund Petroleum Effects Program at Tiburon Laboratory

The final work statement presented to the Outer Continental Shelf Environment Assessment Program (OCSEAP), Environmental Research Laboratory (ERL), NOAA, entitled "Transport, retention and effects of toxic petroleum hydrocarbons in experimental food chains" was approved and funds are being transferred to the Tiburon Laboratory. Work on this program will begin as soon as positions are filled.

Dr. Struhsaker is doing an extensive search for field data on concentrations of water-soluble components of crude oil, particularly aromatic hydrocarbons, in both acute spill and chronic pollution situations. This information will be included in a manuscript reviewing the effects of aromatics on marine fish.

COASTAL FISHERIES INVESTIGATIONS

Preparations Underway for Jordan Cruise in September

Mr. Susumu Kato, Task Leader, reported this month that materials are being purchased and gear made ready at the Tiburon Laboratory for a cruise this September on the NOAA research vessel David Starr Jordan. Primary objective of the cruise will be to determine if commercial trawling for groundfish is feasible in deeper waters off south-central California.

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A sample of the planktonic shrimp, Euphausia pacifica, was obtained from the Moss Landing Marine Laboratories and sent to potential users in the Bay area. Further samples and catch rate data are needed to learn if a fishery for euphausids is economically feasible. This invertebrate is used as feed for aquarium fish, particularly in the growing field of tropical marine fish.

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Two hand-operated squid jigging machines have been borrowed from Warren Rathjen of the NMFS, Northeast Region. They will be used in attempts to catch large species of squid in the Monterey area.

Salmon Net Pens Repaired for August 1976 Rearing and Tagging Program

Mr. Roger Green, Task Leader, reports that work on maintenance, repairs and strengthening of the floating salmon net pens at the Tiburon Laboratory continued throughout April as well as the processing of tagging data from last month's release, for computer storage.

The 40,000 coho salmon to be supplied to the Tiburon Laboratory next August by the California Department of Fish and Game were hatched at their Yountville facility and shipped to the Mad River Hatchery, Arcata, California, where they will be reared to a size of 15 g before delivery to Tiburon.

The first return from the March 31, 1976 release of coho salmon was taken a day later by an angler fishing off Alameda Naval Air Station approximately 3 km southeast of Tiburon in the South Bay. Additional tag returns from the 1975 release brought that total to 20 tag recoveries.

A sample of 50 coho salmon was retained from last month's release for use in a study on the endocrinology of salmon smoltification and adaptation to sea water. Dr. Howard Bern and Mr. Richard Nishioka, University of California, Berkeley, began work on the study this month.

Bathymetric Survey to Measure Offshore Depths at Tiburon Completed

A bathmetric survey of the area just offshore of the Tiburon Laboratory and around the pier was completed this month by the National Ocean Survey research vessel Davidson. The survey was requested for use in the placement of salmon pens and floating breakwaters and vessel docking. The survey results indicate

considerable siltation and shoaling over the years since the occupancy of the Tiburon Laboratory. In some locations, depths have decreased from a previous 450 to 90 cm.

Printing Contract Awarded for Anglers' Guide to the U.S. Pacific Coast

The printing contract for the Anglers' Guide was awarded on April 6 to a printer in Klamath Falls, Oregon. Latest estimates are that the Guide will be about 300 pages long and cost approximately $3.50 per copy to print. It is not yet known what the actual sales price will be but it is hoped that the book will sell for under $10. Distribution should begin sometime in late summer or early fall of 1976.

The Anglers' Guide was co-authored by James L. Squire, Fishery Biologist at La Jolla, and Susan E. Smith, Publications Specialist at Tiburon. The Guide describes marine game fish, fishing grounds, and angler facilities all along the U.S. West Coast from California to Alaska, and around the tropical islands of Hawaii, American Samoa, and Guam.

Chronicle Completed of Historical Changes in Fishing Tackle Methods

This month, Ms. Smith completed, in draft form, a chronicle of major changes in salt water angling methods and tackle in California since the turn of the century. Information was obtained by Ms. Smith from scientific and popular literature and personal communication with tackle manufacturers. She also plans to interview professional partyboat operators and anglers along the coast who have a personal knowledge of changes that have occurred over the past 30 years.

PUBLIC RELATIONS - SOUTHWEST FISHERIES CENTER

School groups visiting the Southwest Fisheries Center for a lecture on the research in progress and a tour of the facilities included the following this month:

April 9 - Mrs. Ann Bird and 15 children from Northmont Elementary School, La Mesa, California.

23 - Mr. Paul Anderson and a Biology class from Patrick Henry High School.

30 - Dr. Al Carsola and an Oceanography class from Mesa College.

On April 19, Mr. James Squire, Fishery Biologist, discussed the NMFS recreational fisheries program with 80 members of the El Cajon Valley Lions Club.

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In connection with the Greater San Diego Science and Engineering Fair, April 21-22, Mr. Izadore Barrett, Acting Center Director, served as one of the judges in the Biology Division. On April 22, Fishery Biologist David Kramer was the lecturer for 25 Fair participants who visited the Center.

Ms. Anita Coit, Administrative Assistant at SWFC and then president of the San Diego Chapter of Federally Employed Women, selected two outstanding young women Science Fair participants for special recognition by FEW for their science project.

HONORS AND AWARDS

Dr. William Perrin received notification this month from Mr. S. Dillon Ripley, Secretary of the Smithsonian Institution, that he has been reappointed as a Research Associate in the Department of Vertebrate Zoology at the Smithsonian, for a period of 3 years, effective May 1, 1976. Mr. Ripley acknowledged Dr. Perrin's past services and expressed the hope that his association with the Smithsonian would afford additional opportunities for productive research.

April 2 - Dr. Paul Smith, Fishery Biologist, La Jolla Laboratory, cash award $455.

19 - Computer Aid Mrs. Lucille Tsukano of the Honolulu Laboratory received a Superior Performance Award in the form of a Quality Step Increase.

SEMINARS

La Jolla Laboratory

April 12 - Dr. Joel W. Hedgpeth, Visiting Professor, Scripps Institution of Oceanography, discussed, "Coastal problems in science and art."

23 - Dr. Julien Goulet, Chief, NMFS Resource Assessment Division, Washington, D.C., spoke on, "The environment of the U.S. living marine resources."

Tiburon Laboratory

April 5 - Mr. Mickey Eldridge presented a seminar at the University of California at Davis entitled, "Early life stages of marine fishes--new perspectives."

23 - Dr. Robert Spies, Lawrence-Livermore Laboratory, presented a seminar at the Tiburon Laboratory entitled "Ecological studies near natural oil seeps."

TRAINING

Honolulu Laboratory

April 9 - Mrs. Sally Kuba attended a session on using "Time Sharing Option" utilities, given at the University of Hawaii Computing Center. On the 19th, 21st, and 23rd, Mrs. Kuba also attended sessions on creating user load modules for frequently used computer programs.

21 - 23 - Mr. Tamio Otsu attended the "Management for Government Administrators" course presented by the American Management Association at the Hilton Hawaiian Village.

MEETINGS AND TRAVEL

April 4 - 7 - Program Planning Officer David Mackett traveled to Washington, D.C. to attend a series of meetings on the fishery management information/automatic data processing system.

5 - Mr. Peter T. Wilson, FAO/UNDP, Port Moresby, Papua, New Guinea met with Mr. R. Shomura, Director, HL, to discuss subjects of mutual interest and job vacancies in Papua, New Guinea.

6 - Peter Adams, TL, attended a meeting at the University of California, Davis, to discuss competitive relationships of rockfish.

6 - 7 - Susumu Kato, TL, traveled to Moss Landing and Monterey, California, to meet with fish processors and Sea Grant advisors regarding experimental fishery for large squid.

April 7 - 9 - Dr. Paul Smith, (LJL) was in Washington, D.C. to confer with the staff of the NMFS Resource Assessment group on cooperative hydroacoustic surveys.

8 - Southwest Region/Center Meeting at the Southwest Fisheries Center. Attending from the Region were Mr. G. Howard, Director, and Mr. Floyd Anders, Deputy Regional Director.

12 - 14 - Dr. Reuben Lasker, Mr. Mackett, and Dr. G. Stauffer, LJL, were in New York for U.S. - Mexico fishery scientific meetings.

13 - 15 - Norman Abramson, Director, TL, attended a meeting of the Review Committee on recreational fishing household surveys in Washington, D.C.

14 - Mr. Peter Wilson accompanied Mr. R. T. "Dick" Shaver, General Manager - Palau for Van Camp Sea Food Company, to meet with Messrs. Shomura and Richard Uchida, HL, to discuss the fisheries of Papua, New Guinea, Palau, and Hawaii.

15 - Mr. I. Barrett, LJL, traveled to Sacramento for the State/Federal Steering Committee Meeting, where he as joined also by Mr. Mackett.

15 - Mr. Shomura, with Regional Representatives Robert T. B. Iversen and John J. Naughton, HL, visited the 14th Coast Guard District office to review Extended Jurisdiction, especially in respect to the problems of enforcement. The meeting was attended by other Federal agency representatives.

19 - 20 - Sea Grant representatives met with NMFS staff from the SW Region (Messrs. Howard, Anders, Bribitzer and Kramer) and Center to become better acquainted with the NMFS Southwest Region and Fisheries Centers overview and mission. The 2-day meeting focused on such subjects as Extended Jurisdiction (including State-Federal), NMFS organization, resource management programs, financial assistance, Pacific Tuna Development Foundation, and a detailed exposition of the SWFC's present research and future directions. The 2-day meeting culminated in an open discussion on ways to improve communications between NMFS elements in California and Sea Grant.

April 19 - Mr. Mackett, LJL, traveled to Sacramento to meet with Ms. Tim Farley and Mr. Odemar to establish an agenda for a fisheries management information systems meeting with the state.

20 - Mr. Shomura, HL, met with Dr. Ken Kamimura, dean of Vocational Technical Education, Leeward Community College, and Gary L. "Skip" Naftel, captain of the Easy Rider, to discuss vessel needs for training of LCC students. Mr. Shomura's role was principally to introduce the two parties to each other.

21 - California Department of Fish and Game held a public meeting at the Tiburon Laboratory to receive suggestions or methods of regulating the 1977 herring fishery.

- Mrs. Wally Giguere attended the first meeting of the Federal Telecommunications Council of San Francisco (FTC) at Treasure Island, which is being established as a pilot project.

22 - Dr. William Fox, of the La Jolla Laboratory, met with Messrs. Frank Alverson and John De Beer of the tuna industry-sponsored Porpoise Rescue Foundation and Manual Silva of the American Tunaboat Association to discuss the objectives, organization, and approach of a skipper panel to review problem purse seine sets identified through analysis of NMFS observer data and to recommend solutions for reducing porpoise mortalities.

23 - Upon the arrival on April 22 of two San Diego-based albacore fishing vessels, the Typhoon skippered by Keith F. Coburn and the Santa Ines, under Dan Romero, Mr. Shomura held a briefing session at the Laboratory with the two vessel captains, representatives from the U.S. Fish and Wildlife Service, Fleet Weather Central, U.S. Coast Guard (intelligence and law enforcement), and Laboratory staff members in attendance. Discussion topics included regulations of the Wildlife Refuge, weather, fishing information, and the services available from the various Federal agencies. The two trollers are on charter to the American Fishermen's Research Foundation and the Pacific Tuna Development Foundation to conduct exploratory fishing and research operations for albacore in the central North Pacific.

April 25 - 28 - Mr. Barrett, LJL, in New York for meeting with Mexicans on Extended Jurisdiction. Subsequently, he traveled to Newark, Delaware for an economics meeting and then to Washington, D.C. for a Regional Director/Center Directors meeting.

26 - 27 - Mr. Shomura, HL, attended the first day of a 2-day Eastland Fisheries Survey conference (workshop on marine fisheries) convened at the Pagoda Hotel in Honolulu under the joint sponsorship of the Pacific Marine Fisheries Commission and the Division of Fish and Game of the Department of Land and Natural Resources, State of Hawaii. Mr. Heeny Yuen attended the second day's session to participate in the group discussion meeting of the recreational sector.

27 - Mr. Shomura met with Skip Naftel and Paul Struhsaker to discuss the resources of the northwestern Hawaiian Islands.

- Librarian Hazel Nishimura, HL, attended a BIOSIS Workshop at the University of Hawaii sponsored by the UH libraries, the UH Graduate School of Library Studies, Special Libraries Association--Hawaiian Pacific Chapter, and the Graduate School Alumni Group. Mr. Arthur W. Elias, BIOSIS Director for Professional Services, previewed the data base available from Biological Abstracts.

28 - Mr. Mackett, LJL, in San Francisco for State/Federal meeting.

- Mr. Shomura, HL, met with Mr. Perry White of Belt, Collins and Associates, and organization under contract to the Hawaii State Department of Planning and Economic Development to explore the need and feasibility of an Ocean Science Center in Hawaii. This was a recommendation listed in Hawaii and the Sea, the State of Hawaii's guiding document for ocean-related affairs.

- Norman Abramson, TL, attended a meeting in San Francisco called by the State-Federal Technical Committee to discuss the activities of various groups who are developing information systems involving California fisheries data.

April 29 - Mr. Shomura, HL, called a meeting of the ad hoc Baitfish Committee at the Honolulu Laboratory to discuss the status and future plans of the anchovy transport project, including funding problems. Also discussed was the status of the baitboat and purse seine charters.

- Mr. Shomura, HL, attended an informal meeting held at the Honolulu Laboratory of industry and state officials to discuss various aspects of Extended Jurisdiction and the Western Pacific Regional Council. Also in attendance was Robert Iversen, Regional Representative, Southwest Region.

- Mr. Nick Trutanic, Star-Kist Foods, Inc., Terminal Island, met briefly with Mr. Shomura especially to thank him for his efforts in arranging for the interview of applicants to work for Star-Kist at Papua, New Guinea.

30 - Mr. Shomura met with several staff members and Messrs. Iversen and Naughton of the Southwest Regional Office to discuss the Laboratory's possible role under Extended Jurisdiction, especially in research and the interface with the Western Pacific Regional Council.

VISITORS

Honolulu Laboratory

April 2 - Dr. Hideo Soeda, Associate Professor, Department of Fisheries Nihon University, Tokyo, Japan.

6 - Mr. John Miki, Management Consultant, Honolulu, Hawaii.

14 - Dr. Ted Hobson and Mr. Tony Chess, Tiburon Laboratory, NMFS, Tiburon, California.

- Messrs. Clifford H. Fiscus and Robert DeLong, Marine Mammal Division, NMFS, Seattle, Washington.

- Dr. Hideo Soeda, Associate Professor, Department of Fisheries, Nihon University, Tokyo, Japan.

20 - Mss. Candance A. Turner and LaGreta Nielsen, Northwest Administrative Service Office (Personnel Division), NOAA, Seattle, Wahsington.

23 - Dr. Vijayalakshmi R. Nair, National Institute of Oceanography, Dona Paula, Goa, India.

La Jolla Laboratory

April 15 - Dr. George Anderson of the University of Washington and senior scientific advisor of the DOMES project met with Drs. M. Laurs and G. Moser concerning data which may be available on the eastern tropical Pacific.

19 - 22 - Messrs. Ray Sauer and Graham Mathis, NASO, Procurement, Seattle, Washington.

20 - K.E. Taggart and William R. Custis, NOAA research vessel Oceanographer, Seattle, Washington.

22 - Mr. Al Bowman from the Jet propulsion Laboratory, Pasadena, California.

22 - 23 - Dr. Julien Goulet, NMFS Resource Assessment Division, Washington, D.C.

23 - John J. Paulson, Jet Propulsion Laboratory, Pasadena, California.

26 - Manuel de Rocha Gamba, Instituto de Pesca, Sec. Agricultura, Santos, Brasil.

27 - Jeff Breiwick, U.S. Marine Mammal Commission, University of Washington, College of Fisheries, Seattle, Washington.

30 - Dr. Donald P. Martineau, Deputy Associate Administrator for Marine Resources, NOAA, met with division chiefs and program leaders for informal discussions.

Tiburon Laboratory

April 1 - Percy Washington, NMFS, Seattle, Washington.

- Robert Beebe, Employment Development Department of California, San Rafael, California.

2 - Mary Koblunich and David Ambrose, Moss Landing Marine Laboratory, Moss Landing, California.

6 - Bill Benach, Naval Weather Service, Alameda, California.

April 9 - Thomas L. Waite, Marketing Information Unlimited, Berkeley, California.

10 - David Cutchin, National Science Foundation, Washington, D.C.

12 - Kunioki Takayama and Mr. and Mrs. C.C. Chang, Western Concept, San Francisco, California.

21 - Gaspare Aliotto, Aliotto Fish Co., Monterey, California.

- William Petrovich, California Department of Fish and Game, Sacramento, California.

- Walter Dahlstrom, California Department of Fish and Game, Menlo Park, California.

22 - James Czerwonky, NOAA, NMFS, Fx5, Washington, D.C.

- Jim Johnson, NMFS, Pacific Environmental Group, Monterey, California.

23 - Hideo Soeda, Nihon University, Tokyo, Japan.

- Robert Spies, Paul Davis, Thomas Distler, Lawrence-Livermore Laboratory.

- Robert Crittenden and Jay Carroll, Pacific Marine Station, Dillon Beach, California.

26 - 29 - Chris Fee, NASO, Personnel, Terminal Island, California.

27 - Robert Huffer, Scripps Institution of Oceanography, La Jolla, California.

28 - Karl Jugel, NOAA Office of Marine Minerals, Rockville, Maryland.

- John Padan, Pacific Marine Environmental Laboratory, Seattle, Washington.

29 - Donald P. Martineau, Deputy Associate Administrator for Marine Resources, NOAA, Rockville, Maryland.

PERSONNEL

		Laboratory
April 1	- Susan D'Vincent, Biological Technician, Temporary Appointment.	La Jolla
	- John Butler, Biological Technician, Temporary Appointment.	La Jolla
	- Barbara Sumida, Biological Technician, Temporary Appointment.	La Jolla
	- Robert Pitman, Biological Aid, Expiration of Appointment.	La Jolla
	- Philip Unitt, Biological Aid, Expiration of Appointment.	La Jolla
11	- Charles Oliver, Computer Specialist, Promotion.	La Jolla
12	- Robert Butler, Computer Programmer, Career-Conditional Appointment (part-time).	La Jolla
13	- Sharon Duke, Statistical Assistant, Resignation.	La Jolla
19	- Priscilla Sloan, Biological Technician, Temporary Appointment.	La Jolla
20	- Lawrence Means, Physical Science Aid, Expiration of Appointment.	La Jolla
	- Thomas Byles, Biological Aid (Fisheries), Resignation.	Honolulu
23	- William Walker, Biological Technician, Resignation.	La Jolla
25	- Marian Yong, Mathematician, Promotion	Honolulu
26	- Lorraine Downing, Name change to Lorraine C. Prescott.	La Jolla

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